NOTICE

FB400/FB900 Digital Controller

This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and telecommunications. The figures, diagrams and numeric values used in this manual are only for purpose of illustration.

RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.

RKC is not responsible for any damage and injury resulting from the use of instruments made by installing this instrument.

Permanence maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.

Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty, expressed or implied, with respect to accuracy of the information. The information in this manual is subject to change without prior notice.

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1. MOUNTING

1.1 Mounting Cautions

(1) This instrument is intended to be used under the following environmental conditions.

- Outdoor: 0 to 50 °C
- Relative humidity: 5 to 95 RH

(2) Avoid the following conditions when selecting the mounting location:

- Rapid changes in ambient temperature which may cause condensation.
- Water, oil, chemicals, vapor or steam splashes.
- Excessive dust, salt spray from the sea, etc.
- Excessive induction noise, static electricity, magnetic fields or noise.
- Impact or vibration.
- Exposure to direct sunlight.
- Excessive dampness.

(3) Take the following points into consideration when mounting this instrument in the panel:

- Provide adequate ventilation space so that heat does not build up.
- Do not mount this instrument directly above equipment that generates a large amount of heat (transformers, semi-conductor functional devices, large-wattage resistors).

1.2 Dimensions

FB400

| Unit (mm) | Panel thickness: 10.0 to 10.6
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<tr>
<td>60.5</td>
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FB900

| Unit (mm) | Panel thickness: 9.5 to 10.4
<table>
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<tr>
<td>60.5</td>
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1.3 Procedures of Mounting and Removing

Mounting procedures

1. Prepare the panel cutout as specified in Fig. 1.
2. Insert the instrument into the panel cutout.
3. Mount the instrument to the panel using the following method of the mounting groove of the instrument. (Fig. 1)
4. Push the instrument onto the bracket until the bracket is firmly secured. (Fig. 2)
5. Turn off and then turn on the power supply after the power supply terminals are connected. (Fig. 3)

Removing procedures

1. Turn the power OFF.
2. Remove the wire. (Fig. 4)
3. Loosen the screw of the mounting bracket. (Fig. 4)
4. Lift the latch of the mounting bracket (5), then pull the mounting bracket (2) to remove it from the case. (Fig. 4, Fig. 5)
5. The other mounting bracket should be removed in the same way described in 3 and 4.
6. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 5)

Caution for the terminal cover usage:

- Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
- Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise reduce.
- About five seconds are required as preparation time for contact output every time the instrument is turned on. Use a delay relay when the output line is used for an external interlock circuit.
- Power supply wiring must be twisted and have a low voltage drop.
- For an instrument with a 24 V power supply, supply power from a SELV circuit.
- This instrument is not furnished with a power supply switch or fuse. Therefore, if a fuse or power supply switch is required, insert close to the instrument. Recommended fuse rating: Rated voltage 250 V. Rated current 1 A.
- Use the solderless terminal lug. (Applicable wire: Solid/twisted wire of 2 mm²)
- Use the solderless terminal lug. (Size: M5 x 6 (with 5.8 x 5.8 square washer) Recommended tightening torque: 0.4 N·m (4 kgf-cm))
- Applicable wire: Solid/twisted wire of 2 mm²
- Recommended terminal: Screw terminal with isolation (M3 screw, with 5.5 mm, hole diameter 3.2 mm)
- Up to two solderless terminal lugs can be connected to one terminal screw, then refer to Fig. 6.

2. WIRING

2.1 Wiring Cautions

- For thermocouple input, use the appropriate compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between the leads.
- To avoid noise induction, keep input signal wire away from instrument power line, load line and power lines of other electric equipment.
- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.

- Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
- Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
- Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise reduce.
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**3. SPECIFICATIONS**

### Measured input
- **Number of input**: 1 point
- **Input type and range**: See table 2.
- **Sampling cycle**: 100 ms (50 or 250 ms is selectable).
- **Influence of external resistance**: See table 4.
- **Influence of measurement offset**: See table 4.
- **Input impedance**: 1000 Ω ± 0.5% for each input type.
- **Sensor current**: Input span to input span.
- **Input span to digital**: 0.0 ± 0.1% (0.0% OFF)
- **Input capacity**: ±25.0% of input span ± 50.0% (0.0% OFF)
- **Remote setting (RTD input)**
  - **Number of input**: 2 points (not isolated from measured input)
  - **Input type and range**: See table 2.
  - **Sampling cycle**: Twice of the measured input sampling cycle
  - **Input impedance**: ±25.0% of input span ± 50.0% (0.0% OFF)
  - **Sensor current**: Input span to input span
- **Digital input (DI)**
  - **Number of input**: 6 points
  - **Input method**: Dry contact
  - **Input capacity**: ±5% of input span ± 10% (0.0% OFF)
  - **Contact current**: 5 mA or more
  - **Contact voltage**: 30 V DC or less
  - **Relay input contact (2)**
    - **Input type and range**: dry contact
    - **Current**: 5 mA or more
    - **Voltage**: 30 V DC or less
    - **Relay input contact (3)**
      - **Input type and range**: dry contact
      - **Current**: 5 mA or more
      - **Voltage**: 30 V DC or less

### Current transformer (CT) input (Optional)
- **Number of input**: 2 points
- **Input method**: “when RTD input is selected” 1 point, “when CT input is selected” 1 point
- **Input range**: 0 to 5 V DC or 10 V DC
- **Sampling cycle**: Twice of the measured input sampling cycle
- **Sensor current**: Input span to input span
- **Contact current**: ±25.0% of input span ± 50.0% (0.0% OFF)
- **Contact voltage**: 30 V DC or less
- **Output**: 20 mA DC
- **Output current rating**: 20 mA DC
- **Output impedance**: 1000 Ω or less
- **Relay contact output**: 2 points
  - **Input type and range**: dry contact
  - **Current**: 5 mA or more
  - **Voltage**: 30 V DC or less

### Feedback resistance (FBR) input (Optional)
- **Number of input**: 1 point
- **Input type and range**: 1000 Ω 
- **Sampling cycle**: Twice of the measured input sampling cycle
- **Sensor current**: Input span to input span
- **Contact current**: ±25.0% of input span ± 50.0% (0.0% OFF)
- **Contact voltage**: 30 V DC or less
- **Output**: 20 mA DC
- **Output current rating**: 20 mA DC
- **Output impedance**: 1000 Ω or less
- **Relay contact output**: 2 points
  - **Input type and range**: dry contact
  - **Current**: 5 mA or more
  - **Voltage**: 30 V DC or less

### Remote setting (RST input)
- **Number of input**: 1 point (not isolated from measured input)
- **Input type and range**: See table 2.
- **Sampling cycle**: Twice of the measured input sampling cycle
- **Input impedance**: ±25.0% of input span ± 50.0% (0.0% OFF)
- **Sensor current**: Input span to input span
- **Contact current**: ±25.0% of input span ± 50.0% (0.0% OFF)
- **Contact voltage**: 30 V DC or less
- **Output**: 20 mA DC
- **Output current rating**: 20 mA DC
- **Output impedance**: 1000 Ω or less
- **Relay contact output**: 2 points
  - **Input type and range**: dry contact
  - **Current**: 5 mA or more
  - **Voltage**: 30 V DC or less

### Potential forward (FBR) input (Optional)
- **Number of input**: 1 point (use the special transformer)
- **Input type and range**: Line voltage
  - **Current**: 10 A or more
  - **Power factor**: Automatic detection
  - **Power consumption**: (at maximum load)
    - 100 to 240 V AC type (% reading 25%)
      - [overload input] 20 mA AC transformer (PTT-10)
      - [overload input] 20 mA AC transformer (PTT-20)
    - [overload input] 20 mA AC transformer (PTT-10)
    - [overload input] 20 mA AC transformer (PTT-20)

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- **Number of input**: 1 point (use the special transformer)
- **Input type and range**: Line voltage
  - **Current**: 10 A or more
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    - 100 to 240 V AC type (% reading 25%)
      - [overload input] 20 mA AC transformer (PTT-10)
      - [overload input] 20 mA AC transformer (PTT-20)
    - [overload input] 20 mA AC transformer (PTT-10)
    - [overload input] 20 mA AC transformer (PTT-20)

### Power consumption (at maximum load)
- 100 to 240 V AC type (% reading 25%)
  - [overload input] 20 mA AC transformer (PTT-10)
  - [overload input] 20 mA AC transformer (PTT-20)

### Communication (Optional)
- **Interface**: Based on RS-232C, RS-485, or RS-422A
- **Data rate**: 9600, 19200, 38400, 57600, 115200 bps
- **Protocol**: Communication (ANSI X3.28) (Optional)
  - 1: T (communication 1)
  - 2: T (communication 2)
  - 3: P (communication 3)
  - 4: P (communication 4)
  - 5: P (communication 5)

### General specifications
- **Power supply voltage**: 100 to 130 V AC (105 to 125 V AC)
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC
- **Input voltage**: 100 to 240 V AC
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC

### Weight
- **Rating 24 V DC**: 801 g
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC
  - [housing] 35.0 to 65.0 V DC

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  - [housing] 35.0 to 65.0 V DC
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  - [housing] 35.0 to 65.0 V DC

### Configuration and Communication (Quick Start code)
- **Configuration and Communication (Quick Start code)**
  - 1: No configuration and communication
  - 2: Configuration and communication
  - 3: Configuration and communication
  - 4: Configuration and communication
  - 5: Configuration and communication

### Calibration
- **Calibration**: 1 point (for calibration)